2012 SCSU MATH CONTEST
7th and 8th Grade Test

DIRECTIONS: Select the BEST completion or response from among those given. Scientific and graphing calculators are allowed. Symbolic calculators are not allowed.

1. When a counting number N is divided by its reciprocal, the answer is ____.

A. 1 B. $\sqrt{N}$ C. $2N$ D. N^2 E. none of these

2. How many two-digit numbers are divisible by 2, 4, 6, and 8?

A. 2 B. 4 C. 5 D. 6 E. none of these

3. A rectangular field is 300 feet wide and 400 feet long. Random sampling indicates that on the average, three ants can be found per square inch throughout the field. Which number most closely approximates the number of ants in the field?

A. 50 thousand B. 500 thousand C. 5 million D. 50 million E. 500 million

4. Tom and Suzie are siblings. Tom has as many brothers as sisters. Suzie has twice as many brothers as sisters. How many brothers does Suzie have?

A. 2 B. 3 C. 4 D. 5 E. 6

5. When the expression $2005^2 + 2005^0 + 2005^0 + 2005^5$ is evaluated, the last two digits of the answer would be

A. 52 B. 50 C. 25 D. 20 E. 05

6. A weighted six-sided die is created so that the side showing either 1 or 2 will occur three times more often than each of the sides showing 3, 4, 5, or 6. If the die is rolled twice, what percent of the time should the sum of the two top faces equal 7?

A. 50% B. 39% C. 28% D. 16.7% E. 14%

7. If A represents the area of a given circle with diameter d, radius r (r >2), and circumference C, then $\frac{C}{d}$ is equivalent to which one of the following expressions?

A. $\frac{A}{r^2}$ B. $\frac{A}{r}$ C. $\frac{A}{d}$ D. $\frac{A}{dr}$ E. $\frac{A}{d^2}$

8. Which of the following is equivalent to $\dfrac{\frac{1}{2}+\frac{1}{4}+\frac{1}{8}+\frac{1}{16}+\frac{1}{32}+\frac{1}{64}}{\frac{1}{2}-\frac{1}{4}-\frac{1}{8}-\frac{1}{16}-\frac{1}{32}-\frac{1}{64}}$?

A. 1 B. 2 C. 3 D. 63 E. 64

9. A $71\frac{1}{2}$ inch long rope is cut into three pieces. The second piece is three times as long as the first piece and the third piece is half as long as the second piece. How long is the third piece?

A. 23.5 in. B. 19.5 in. C. 17.5 in. D. 13.5 in. E. 13.0 in.

10. Suppose you own a car that averages 32 miles per gallon and gas costs $3.25 per gallon. If you work at a job for $13 per hour, how many hours would you have to work to earn enough money to drive the car 256,000 miles?

A. 206 B. 1000 C. 2000 D. 29,538 E. none of these

11. A gumball machine contains nine red, seven white, and eight blue gumballs.
What is the fewest number of gumballs you must buy to be sure of getting four gumballs of the same color?

A. 8 B. 9 C. 10 D. 12 E. 18

12. The sum of two prime numbers is 85. Find the product of these two prime numbers.

A. 166 B. 400 C. 546 D. 1806 E. none of these

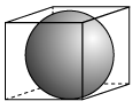
13. On Monday Tom studied from 6:48 am to 7:31 am, then from 11:28 am to 12:11 pm, and from 4:39 pm to 10:01 pm.
Approximately how many seconds did Tom study on Monday?

A. 405 B. 2580 C. 19,320 D. 24,480 E. 1,468,800

14. Two rectangles have the same area. One rectangle has a base of 20 and a height of *h*. The other rectangle has a base of 10.
For what value of *h* are the perimeters of the two rectangles the same?

A. 5 B. 10 C. 15 D. 20 E. 25

15. A sphere is inscribed in a cube whose surface area is 36. Determine the surface area of the sphere.
Note: The surface area of a sphere is $4\pi r^2$.



A. 6π B. $\pi\sqrt{6}$ C. 36π D. 24π E. 144π

16. In the expression $\frac{a}{b}+\frac{c}{d}+\frac{e}{f}$, each letter is replaced by a different digit from 1, 2, 3, 4, 5, and 6.
What is the largest possible value of this expression?

A. $8\frac{2}{3}$ B. $9\frac{5}{6}$ C. $9\frac{1}{3}$ D. $9\frac{2}{3}$ E. $10\frac{1}{3}$

17. To the nearest whole number, how many miles per hour is a car traveling if its wheels have diameters of three feet and turn 400 times a minute? Note: 1 mile = 5280 feet

A. 14 B. 21 C. 43 D. 86 E. 128

18. If *M* is 30 percent of *Q*, *Q* is 20 percent of *P*, and *N* is 50 percent of *P*, then $\frac{M}{N}$ equals

A. $\frac{3}{250}$ B. $\frac{3}{25}$ C. 1 D. $\frac{6}{5}$ E. $\frac{4}{3}$

19. A crow flies directly from its nest to a point located 1 mile north and 3 miles east of the nest.
From there, it turns and flies to a second point located 9 miles further north and 2 miles further east.
Finally, the crow flies directly back to its nest. To the nearest mile, what is the total distance the crow flies?

A. 20 miles B. 22 miles C. 24 miles D. 25 miles E. 28 miles

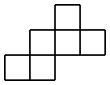
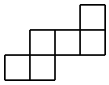
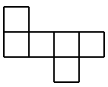
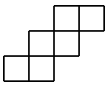
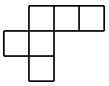
20. Find the value of a digit *A* if the five-digit number 12*A*3*B* is divisible by both 4 and 9 and $A \neq B$.

A. 1 B. 2 C. 3 D. 6 E. 7

21. The area of one side of a rectangular box is 120 cm^2. The area of another side of the box is 72 cm^2. The area of the top of the box is 60 cm^2. What is the volume of the box?

A. 240 cm^3 B. 720 cm^3 C. 800 cm^3 D. 820 cm^3 E. 900 cm^3

22. Which of the following shapes do NOT fold into a cube?

A.  B.  C.  D.  E. 

23. Suppose that a, b, and c are three numbers with a + b = 3, ac + b = 18, and bc + a = 6. What is the value of c?

A. 2 B. 3 C. 6 D. 7 E. 11

24. P, Q, R, S, and T are five different counting numbers between 2 and 19 inclusive.
- P is a two-digit prime number whose digits add up to a prime number.
- Q is a multiple of 5.
- R is an odd number, but not a prime number.
- S is the square of a prime number.
- T is a prime number that is also the mean (average) of P and Q.

Which number is the largest?

A. P B. Q C. R D. S E. T

25. Find the total weight of the tiles needed to cover the walls of a bathroom shower.
The shower is 3 feet wide, 3 feet long and 8 feet high. It is tiled on three sides and the fourth side is open.
Each tile is a square with a side of length 4 inches and weight of 0.125 pounds.
Assume there is no gap between tiles.

A. 81 pounds B. 144 pounds C. 162 pounds D. 648 pounds E. 729 pounds

26. In a prehistoric village, rocks, stones, and pebbles were used as money. The relative values of the "coins" were:
1 rock = 49 pebbles and 1 rock = 7 stones
If a man used 6 rocks to purchase a hide that costs 5 rocks, 2 stones, and 3 pebbles, how much change was he owed?

A. 4 stones, 4 pebbles
B. 5 stones, 4 pebbles
C. 1 rock, 5 stones, 4 pebbles
D. 5 stones, 5 pebbles
E. 6 stones, 5 pebbles

27. Mary will meet her friend Claude 5 hours 25 minutes before their 1:10 p.m. exam. At what time will they meet?

A. 6:15 a.m. B. 6:35 a.m. C. 7:15 a.m. D. 7:35 a.m. E. 7:45 a.m.

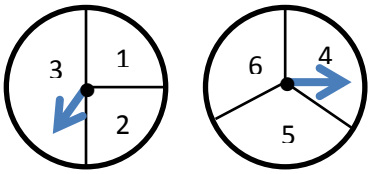
28. The average grade when seven students took a test was exactly 74. When Susan, who was absent on the day of the test, took the test, the new average, rounded to the nearest integer, was 76.
Find the positive difference between the highest and lowest scores that Susan could have received if her score was an integer.

A. 0 B. 1 C. 4 D. 7 E. 8

29. Alice spent $\frac{1}{3}$ of her money at a store and then loaned $\frac{3}{4}$ of what remained to a friend. If she still has \$2 remaining, how many dollars did she originally have?

A. \$6 B. \$8 C. \$12 D. \$16 E. \$24

30. In The first spinner, regions 1 and 2 have the same area and region 3 is twice the area of either region 1 or 2. In the second spinner, each region has the same area. Each spinner is spun and the two resulting numbers are added. What is the probability that the sum of the two numbers is even? Note: If the spinner lands on a line, that spin does not count and it is spun again.



A. $\frac{1}{6}$ B. $\frac{1}{4}$ C. $\frac{1}{3}$ D. $\frac{5}{12}$ E. $\frac{4}{9}$

31. The ordered list of seven numbers below has a median of 30 and a mean of 32. Find the positive difference between *a* and *b.*

18, 21, 24, *a*, 36, 37, *b*

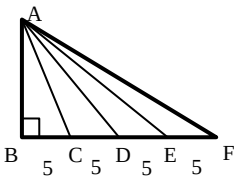
A. 19 B. 28 C. 31 D. 42 E. 58

32. In the figure to the right, X, Y, and Z represent three different digits. The largest possible three-digit sum has which form?

$$\begin{array}{r} XXX \\ YX \\ +\ \ X \\ \hline \end{array}$$

A. XXY B. XYZ C. YYX D. ZZY E. YYZ

33. Choose the response that gives possible areas for △ABC, △ACD, △ADE, and △AEF, respectively. Picture is not drawn to scale.



A. 34, 31, 28, 25 B. 31, 29, 27, 25 C. 25, 28, 31, 34 D. 25, 27, 29, 31 E. 25, 25, 25, 25

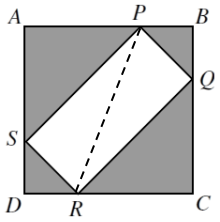
34. In a movie theater line, x people are behind Mark, who is y places ahead of Sam. If there are z people ahead of Sam, how many people are in the line?

A. $z - x + y + 2$ B. $z + x - y + 1$ C. $z - x + y - 1$ D. $z + x - y$ E. $z - x + y$

35. If $a < b < 0$, then which expression has the largest value?

A. $-\frac{1}{ab}$ B. $-\frac{1}{a^2}$ C. $-\frac{1}{b^2}$ D. $-\frac{1}{a^3}$ E. $-\frac{1}{b^3}$

36. In the diagram, two pairs of identical isosceles triangles are cut off of square ABCD, leaving rectangle PQRS. The total area cut off is $200m^2$. What is the length of PR?



A. $\sqrt{200}\ m$ B. $20\ m$ C. $\sqrt{800}\ m$ D. $25\ m$ E. $15\ m$